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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/894,049	06/28/2001	Farnaz Parhami	373722002900	5445

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MORRISON & FOERSTER LLP
755 PAGE MILL RD
PALO ALTO, CA 94304-1018

EXAMINER

STAHL, MICHAEL J

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 09/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/894,049	Applicant(s) PARHAMI ET AL.	
	Examiner Mike Stahl	Art Unit 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-25 is/are allowed.
- 6) ☒ Claim(s) 26-47 is/are rejected.
- 7) ☒ Claim(s) 7 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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Specification

The disclosure is objected to because of the following informalities: In paragraphs [0006] and [0007], each instance of “principle” should be replaced with “principal”. In paragraph [0037], the serial number for the named application should be provided (09/870,876).

Appropriate correction is required.

Claim Objections

Claim 7 is objected to because “width” should be inserted after “waveguide” in line 2.

Drawings

Figure 4 is objected to because box 62 “constituent” should be “constituent”. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 26-33, 35-36, 42, and 47 are rejected under 35 U.S.C. 102(e) as being anticipated by Roberts (US 2002/0122651). It is noted that this published application claims priority to 09/708,452 which was filed on November 9, 2000. The earlier filing date is being relied on to establish the prior art status of this reference.

Roberts discloses an arrayed waveguide grating (fig. 6). The waveguides of the grating may be constructed according to figs. 1-4, which show a substrate 2, a top cladding layer 7, and a waveguide 4 having a width and a height disposed between the substrate and the top cladding layer. Roberts teaches that the birefringence of the waveguide (even prior to the addition of layer 7) depends on its width (paragraph [0034]) and that birefringence leads to polarization dependent frequency difference (which is equivalent to a polarization dependent wavelength difference). Accordingly, the various waveguide widths selected in manufacturing the waveguide grating of fig. 6 would give rise to a predetermined value of polarization dependent wavelength (PDW) as required by claim 26.

As to claims 27 and 32, the PDW may be minimized and may equal zero (paragraphs [0014] and [0043]). It is asserted that although the PDW is primarily controlled by choosing the depth of the overcladding 7, the widths of the waveguides themselves also influence the PDW since they influence the birefringence.

As to claims 28, 30, and 31, the PDW ultimately depends on the stress distribution of the top cladding 7, and the elastic modulus and coefficient of thermal expansion of the top cladding and waveguide layers as derived in the present specification. It is acknowledged that Roberts does not discuss these factors in detail, but it is nevertheless inherent that the PDW depends on

them. The top cladding in Roberts is grown at a temperature of 1050 °C. For purposes of this action, 1050 °C is being considered to be “about” 900 °C within the meaning of claim 47.

As to claim 29, the top cladding has a predetermined composition (silicon dioxide).

As to claim 33, the substrate 2 comprises silicon.

As to claim 35, the thermal oxide growth which forms layer 7 actually occurs over the entire surface of the silicon wafer as described in paragraph [0031]. It is assumed that this includes the side surfaces and the bottom surface of the wafer. Accordingly after the thermal oxide growth step, the substrate would be disposed on a silicon dioxide layer.

As to claim 36, the grating includes a second layer 3 of silicon dioxide.

As to claim 42, the waveguides in the grating have a height between 1 and 10 microns, which encompasses the claimed range (paragraph [0040]).

Claims 26-33, 39, 41-42, and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by McGreer (US 2002/0181868).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

McGreer discloses an arrayed waveguide grating (figs. 3A-3B) including a substrate 88, a top cladding layer 92 disposed on the substrate, and at least one waveguide 72-76 disposed

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between the substrate and the top cladding layer. The widths of the waveguides are selected to provide a predetermined value of PDW (paragraphs [0026] and [0055]). Thus the McGreer device satisfies claim 26.

As to claims 27 and 32, the predetermined value of PDW may be minimized to zero.

As to claims 28, 30, and 31, the PDW ultimately depends on the stress distribution of the top cladding and the elastic modulus and coefficient of thermal expansion of the top cladding and waveguide layers.

As to claim 29, the top cladding **92** has a predetermined composition (doped silica).

As to claim 33, the substrate **88** comprises silicon (paragraph [0062]).

As to claims 39 and 44, the waveguide core and top cladding comprise doped silica.

As to claim 41, the grating may alternatively include polymer (paragraph [0062]).

As to claim 42, the waveguide core has a height between 5 and 12 microns, which overlaps the recited range.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 34, 37-40, and 43-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts.

As to claims 34, 37, and 38, Roberts does not disclose the thickness of substrate 2 or the silicon dioxide layer 3. It is asserted that the thickness values recited in these claims are arbitrary. It would have been obvious to a person of ordinary skill in the art to determine the optimum thickness of each layer of the Roberts device in consideration of costs, thermal dissipation, and other factors. Similarly with regard to claim 43, it would have been obvious to a skilled worker to design the waveguides with a particular width as dictated by performance requirements of an external system which is to use the grating.

As to claims 39-40 and 44-46, Roberts does not mention that the waveguide 4 or top cladding 7 may be doped. It is well known in the art to provide dopants in waveguide cores or claddings to modify properties including the refractive index and viscosity of the waveguide material, among others. It would have been obvious to a skilled person to add dopants of sufficient kind and concentration to the waveguide or top cladding of Roberts in order to modify their properties as needed for a given application.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Allowable Subject Matter

Claims 1-25 are allowed. Claim 1 sets forth a specific method for determining the width of at least one waveguide in an arrayed waveguide grating such that the polarization dependent wavelength (PDW) will have predetermined value. The applied Roberts reference does not describe or suggest all the recited steps, for example, it does not mention determining the stress distribution in the top cladding 7 or using the stress distribution to calculate a relationship between the waveguide width and the PDW. While there is inherently a relationship between the PDW and the waveguide width in a device such as the grating in Roberts, Roberts does not show how to determine it using the steps of claim 1. Claims 2-25 are allowed by dependence from claim 1.

It is noted that the Inoue et al. article cited by applicant discloses a relationship between the birefringence and the core width (fig. 1) and mentions that the birefringence depends on the stress distribution around the core, which in turn depends on the core shape. However Inoue does not teach or suggest actually determining the stress distribution in order to derive the PDW dependence on width. Only experimentally-determined points are provided in fig. 1. In fact Inoue does not even mention a top cladding layer, whereas claim 1 requires determining the stress distribution in the top cladding as well as in a waveguide core.

Conclusion

The references made of record and not relied upon are considered pertinent to applicant's disclosure: EP 1191364 is related to the Inoue article mentioned above but is not available as

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prior art. JP 2001-51139 and JP 7-230012 disclose arrayed waveguide gratings having birefringence controlled by waveguide core widths. US 2003/0021513 is the published version of the present application.

Any inquiry concerning this communication should be directed to Mike Stahl at (703) 305-1520. Official communications eligible for submission by facsimile may be faxed to (703) 872-9318 (before final) or (703) 872-9319 (after final). Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at (703) 308-0956 or to the technical support staff supervisor at (703) 308-3072.

MJS

Michael J. Stahl
Patent Examiner
Art Unit 2874

September 6, 2003


MICHAEL J. STAHL
Patent Examiner
Art Unit 2874